

SIX COMMON LESSON PLANNING PITFALLS – RECOMMENDATIONS FOR NOVICE EDUCATORS

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This study compares perceptions of effective lesson planning, gathered from three years of data collection from a *Methods of Secondary Education* course taught at an NCATE accredited New York State institution. Anecdotal records, video recordings of pre-service teachers' lessons and novice teacher interviews revealed six common pitfalls teachers make when initially developing learning experiences. In looking to generalize those findings to teachers at different experience levels, we interviewed a set of pre-service, first and second year teachers, looking for common struggles when planning lessons. Results show patterns of pitfalls that are both informative and interesting. Our discussion offers suggestions to pre-service and in-service teachers on how to avoid these lesson planning blunders, as well as a lesson planning form that specifically addresses and transforms those common mistakes into the essential elements of well-crafted lessons.

The increased accountability brought about by NCLB, in conjunction with expected nationwide teacher shortages has left many districts in dire need of skillful teachers (Lambert, 2006). Looking to recent college graduates to fill this need, colleges of education are left searching for the best way to prepare their future teachers. Such demands require that teachers are able to create lessons grounded in current learning theory. New teachers must have an eye for assessment and infuse active learning in all that they do. In their preparation, teacher education graduates have undoubtedly been exposed to a magnitude of educational theory supporting these endeavors. However novice teachers historically struggle in incorporating these ideas into their daily lessons. Caught up in the demands of being a first year

teachers, novices can quickly lose sight of these ideals and may begin to find themselves unable to bridge the gap between their university studies and daily practice.

Puzzled by this reality, this study is the result of three years of research and data collection on novice teacher lesson planning and delivery. Information was gathered in a co-taught teacher education classroom where a professor and two practicing secondary educators shared teaching responsibilities. Nearly 500 pieces of teaching were used to extrapolate common pitfalls of lesson planning and their effects on teacher effectiveness. Moreover, this study was extended to include the lesson planning problems of first and second year teachers- a smaller sample of recent graduates. We sought to investigate the following research questions: (1) Do prac-

ticing teachers and pre-service teachers make similar lesson planning mistakes? (2) What can teacher educators do so that pre-service teachers do not repeatedly make the same lesson planning mistakes? Our study addresses these questions.

Methods

Pre-service teachers in our study participated in these micro-teachings throughout the course of the semester which required each pre-service teacher to plan and teach a lesson about an assigned topic to 3-5 of their peers. The co-teaching structure of this course allowed us to observe and participate in the pre service teachers' lessons. In sitting through many of these teachings, over six semesters, we specifically looked for those moments of disengagement, discontinuity or ambiguity in lesson delivery. We also paid special attention to when general confusion developed among the participants in the base group. Some of these lessons were video recorded for further analysis, and both verbal and written reflection data was collected. Common mistakes that were observed by the three co-teachers independently were then synthesized into an initial set of lesson planning 'blunders' which we looked for when the pre service teachers taught again that semester, and in the subsequent semesters.

After discerning the six most common and detrimental pre-service lesson planning pitfalls, we compared our findings to the lesson planning difficulties of teachers at different stages in their teaching careers. Throughout the course of month-

ly professional learning community meetings, we interviewed student teachers, to see if any of the lesson planning issues they mentioned were analogous to those we noticed with our pre-service teachers. We then interviewed a small sample of first and second year teachers (who did not go through our teacher education program) to discuss issues they have when planning learning experiences for their students. Once again, we looked for commonalities to confirm our hypotheses. In compiling all that we discovered from this observational and interview data, we identified generalizable assertions that are presented in the results section below.

Results

The results presented in this paper are the six most common lesson planning 'blunders' that were noted in our novice teacher study. These results were generalized based on the responses of our pre-service, first and second year teachers. After each pitfall is a recommendation for novice teachers and teacher educators. Our hope is that our observations and suggestions will help beginning teachers in their quest to improve their lesson planning and delivery.

1.) The learning objective is unclear

In the first of three microteachings, the pre-service teachers who participated in this study were assigned the task of teaching about an assigned famous person from their discipline to a group of 3-5 of their peers. Since they were not given clear objectives (and since they did not develop the objectives themselves), many

pre-service teachers tried to teach everything about their person's life, and crunched for time without a clear end in mind, they spent much of their time lecturing students about a useless set of inert facts. Much of our observational data found that without a clear learning goal, pre-service teachers tried to cover everything, without developing the conceptual understandings necessary for cognitive growth. We found that pre-service teachers often felt overwhelmed and frustrated when faced with the task of teaching everything about their famous person in less than 30 minutes. Instead of trying to teach one thing, and teach it well, they ended up trying to cover everything and they did it poorly.

Similar struggles were found among our novice teachers who, in doing the best they could to prepare students for state exams, found that they were trying to cram their students with too much content in too short of a time. Without placing any special emphasis or importance on that which forms the conceptual basis of understanding, covering a whirlwind of facts left both the teacher and the students frustrated and confused. While these practicing teachers acknowledged that state standards provide a good place to start in answering the question of what to teach, having a focused learning objective that is clear to both students and teachers can help educators avoid this instructional trap.

Recommendations:

Stiggins' (2008) use of learning targets is a powerful means through which teachers can provide themselves and their

students with a clear understanding of the lesson's objectives. By framing the learning objective as an "I can..." statement that is prominently displayed and acknowledged at the beginning of class, both students and teachers are better prepared to focus their efforts on that content which directly addresses the target. (For example, the learning target for this action research project was 'I can identify mistakes novice teachers make when lesson planning.' With this target in mind we were able to develop interview questions and take observational notes centered on this clear goal. This helped us to stay focused on our performance outcomes and made the development of our hypotheses much easier). Creating and addressing learning targets before instruction begins also makes students active participants in the learning process by allowing them to assess their own mastery of content knowledge, acknowledge what they have learned and seek help if they are not reaching their target goals (Stiggins, 2008). Our review of the current educational literature reminds us that these are consistent with the ways in which students learn best.

2.) *Students do not create an assessment of their understanding or the assessment is completed outside of class*

Our conversations with student teachers and first year teachers led us to discover that the pressures of teaching a whole lesson in a brief 40 minutes often forces new teachers to skip over summative assessments. With behavioral issues to address, housekeeping tasks to perform and mounds of content to cover, new teachers often find

themselves going through the motions of teaching without ever stopping to see what (if anything) their students have learned. Or worse yet, one math teachers that we interviewed stated that she assesses what her students have learned by grading the homework that students complete outside of class. Besides the obvious fidelity issues with this idea, and problems that arise when students do not do their homework at all, we sought to encapsulate these common errors in our second teaching blunder involving summative assessment.

For our pre-service teachers in the micro-teaching setting, this blunder took the form of using discussion as the sole means of assessing student understanding. While discussion can be a powerful formative assessment, without a tangible product demonstrating what students have actually learned, there is no real indication that they learned anything at all. Authentic assessment research (Wiggins, 1990, Darling-Hammond, 1995) indicates that the act of creating an authentic assessment actually improves understanding as students codify their understandings to create something new from their developing ideas. This helps to construct the conceptual understandings for transfer that we desire.

It should also be noted that while useful in some cases, (and specifically mentioned by our first year and student teachers as assessments they use), we do not allow our pre-service teachers to give multiple choice or lower level rote-memorization tests as demonstrations of understanding in their micro-teaching situations. We insist that all of the assess-

ments our pre-service teachers create are authentic assessments, they must be completed in class, and they are to be submitted along with their lesson plans as evidence of what their students have learned. Our hope is that this insistence on authentic assessments will lead itself to the use of active learning, thereby forcing these pre-service teachers to practice the skills they will need to use with their own students.

Recommendations:

While there are limitless possibilities for demonstrations of student understanding, all authentic assessments require that students create a tangible product of what they have learned. Thus, the assessment becomes an active and visible process that helps students to link the material that have learned to the intended learning objectives. When viewed as a part of the instructional process, class time can be used to help learners make connections and reflect on the learning targets, thereby making personal meaning of their new understandings. In this sense, authentic assessment are not a hindrance to covering content, but they are a natural and powerful part of the learning process.

In an effort to help novice teachers create authentic assessments of student understanding, Vermette (1998) has a list of ninety activities teachers can use as demonstrations of student understanding. This list is provided for our pre-service teachers before their first teaching, and they are encouraged to peruse the list for those that match their lesson's learning target. They are encouraged to add to this list and develop their own authentic learning

tasks, which they then reflect upon after their micro-teaching. The list of ninety authentic learning activities is reprinted in figure 1.

3.) *Students do not create evidence of their developing ideas*

In conjunction with our focus on summative assessment, a great deal can also be said for developing student understandings through the use of multiple formative assessments during the lesson. In our research, we found that even when our pre-

Figure 1

Ninety Activities for K-12 Students

Ads	Fables	Product descriptions
Allegories	Game Rules	Puppet shows
Announcements	Graffiti	Puzzles
Autobiographies	Good news-bad news	Questionnaires
Awards	Grocery lists	Questions
Bedtime stories	Headlines	Quizzes
Billboards	How-to-do-it speeches	Quotations
Book Jackets	Impromptu speeches	Real estates notices
Book reviews	Interviews	Recipes
Brochures	Job applications	Remedies
Bulletins	Journals	Reports
Bumper stickers	Laboratory notes	Requests
Campaign speeches	Letters	Requisitions
Captions	Lists	Resumes
Cartoons	Lyrics	Reviews
Certificates	Magazines	Sales pitches
Character sketches	Menus	Schedules
Comic strips	Mysteries	Self descriptions
Contracts	Myths	Sequels
Conversations	Newscasts	Serialized stories
Critiques	Newspapers	Slogans
Definitions	Obituaries	Speeches
Diaries	Observational notes	TV commercials
Directions	Pamphlets	Telegraphs
Directories	Parodies	Travel folders
Dramas	Persuasive letters	Tributes
Editorials	Plays	Vignettes
Epitaphs	Poems	Want ads
Encyclopedia entries	Posters	Wanted posters
Essays	Propaganda sheets	Wills

Source: Vermette, P. J. (1998). *Making cooperative learning work: Student teams in K-12 classrooms*. Upper Saddle River, N.J: Merrill.

service teachers heeded our advice regarding authentic summative assessments, they often collected little to no evidence during the lesson to guide their instruction. As a result, they had no clue as to their students' current level of understanding and could not differentiate their instruction to meet the needs of their students. We also found that those pre-service teachers who did not have evidence of students' developing ideas were less likely to use active learning strategies to engage their students. Since nearly all note making and active learning techniques produce some sort of demonstration of student understanding, a strong focus on evidence creation during the lesson helps pre-service teachers to apply Constructivist learning theory to their practice.

At the novice and student teaching levels, this blunder manifested itself in several stories regarding failures in student achievement. In reflecting on struggles they were having, several novice teachers stated that their students continually performed poorly on tests. One particular student teacher, frustrated over her students' poor test results, described how her 9th grade students continually insisted that they understood the material, but were perpetually unable to demonstrate this knowledge when given a summative exam. After a discussion regarding formative assessments and the use of learning targets, she later reported that she began using out slips and exit tickets as formative evidence of students' understanding of the daily learning target. Then after collecting and synthesizing this formative data, she was able to diagnose her students'

errors before the unit test and subsequently adapt her instruction to her students' needs before their summative unit exam. The result was improved test scores and increased teacher and student satisfaction.

Recommendations:

While checks for understanding during instruction can be as simple as a think-pair-share, or as elaborate one of Vermette's (1998) ninety activities, a new school of thought looks at six different ways to assess student understanding. While they can be used as summative assessments, Wiggins and McTighe's (2005) 6 Facets of Understanding also provide six equally legitimate and powerful ways to assess student understanding during instruction. A synthesis of their work, as well as examples of how each facet can be used as assessment data is presented in figure 2.

Figure 2

Facet of Understanding	Description	Example of Formative Assessment
Explanation	"To ensure students understand why an answer or approach is the right one. Students explain or justify their responses or justify their course of action."	Students develop the outline to a brochure which explain the principles and practices of a particular type of technology
Interpretation	"To ensure students avoid the pitfall of looking for the "right answer" and demand answers that are principled...students are able to encompass as many salient facts and points of view as possible."	Students make their own notes by developing a historical timeline of the development of a particular type of technology.
Application	"To ensure students' key performances are conscious and explicit reflection, self-assessment, and self adjustment, with reasoning made evident. Authentic assessment requires a real or simulated audience, purpose, setting, and options for personalizing the work, realistic constraints, and 'background noise'."	Students apply what they have learned about the Exxon Valdez oil spill to create a list of possible options for President Obama in cleaning up the BP oil spill in the Gulf of Mexico.
Perspective	"To ensure students know the importance or significance of an idea and to grasp its importance or unimportance. Encourage students to step back and ask, "Of what value is this knowledge?" "How important is this idea?" "What does this idea enable us to do that is important?."	Students investigate about a technological artifact from the perspective of different regions and countries.
Empathy	"To ensure students develop the ability to see the world from different viewpoints in order to understand the diversity of thought and feeling in the world."	Students imagine they are politicians debating the value of nuclear power. In a journal, they write their thoughts and feelings explaining why they agree or disagree with the use of nuclear power.
Self-Knowledge	"To ensure students are deeply aware of the boundaries of their own and others' understanding; able to recognize their own prejudices and projections; has integrity – able and willing to act on what one understands."	In their journals, students reflect on their own progress of understanding about one of the standards in <i>Standards for Technological Literacy: Content for the Study of Technology</i> . They evaluate the extent to which they have improved, what task or assignment was the most challenging and why, and which project or product of work they are most proud of and why.

Source: Adapted from Wiggins, G., & McTighe, J. (2005). *Understanding by Design*. p. 85-97. Alexandria, VA: Association for Supervision and Curriculum Development.

4.) The assessment does not match the learning objective

Throughout our study we found that even if our pre-service teachers developed a clear learning objective, attempted to collect evidence throughout the lesson and even if they ended with an authentic assessment, their lesson could still end in disaster if they fell into pitfall #4: mismatching the assessment with the learning objective. Our observation of pre-service teachers' lessons showed several discontinuities between the authentic assessments tasks they used and the intended learning outcomes they desired. Common mistakes included:

- Students were working on a task that did not enhance or was not related to their understanding of the larger concept simply because it was 'fun'.
- Students became very engaged in project creation but lost sight of why they were doing the project in the first place.
- Students became interested in a minute fact that misrepresented the overall goal of the lesson.

This pitfall can be tricky for pre-service teachers to prevent, and misleading in outward appearance, because many of the pre-service teachers in our study assumed that students who are engaged in the desired task will gain the cognitive benefit they intended.

An example of this came through in an interview of a first year teacher whose high school math students were creating a community garden as a culminating authentic assessment of their unit on geometry. After

initially using the area, perimeter, midpoint and distance formulas they had been learning in class to lay out the plans for this community garden, her students soon got very engaged in the actual gardening of their plants and stopped using the geometric formulas that encompassed the teacher's learning objectives. The students were highly motivated and on task in planting their garden plots, but since they were engaged in the act of gardening and not the act of using geometric formulas, they showed virtually no knowledge of how to use area, perimeter, midpoint or distance formulas on their unit test (even on examples that made references to designing a garden!).

This first year teacher fell into pitfall #4 - her assessment did not align with her objective. If the objective was for her students to learn gardening techniques or to create a beautiful garden, her students all would have passed with flying colors. After her students' first day of laying out the garden however, the authentic assessment of creating the garden quickly mismatched the objective of using geometric formulas. It is important to remember that students will only learn and understand that which they actively do, so a teacher's assessment must match his/her objectives to get the cognitive benefit of the authentic assessment.

Recommendations:

Such a planning mishap can be avoided through the use of learning targets (Stiggins, 2008) as outlined in lesson planning blunder #1. When teachers begin with well-defined targets of intended outcomes,

they are able to develop assessments that both (1) reflect what they teach and (2) define what they expect students to learn (Stiggins, 2008). Beginning the lesson planning process with a clearly defined statement of what students will be able to do at the end of the lesson (possibly which utilizes one of the Six Facets of Understanding) is one way to ensure that the assessment matches the intended learning outcomes.

Stiggins (2008) and Wiggins and McTighe (2005) have similar recommendations for avoiding this common planning mistake. As described in their 2005 book, Wiggins and McTighe's concept of 'backwards planning' states that teachers should begin the lesson planning process by identifying the desired results (Stiggins' would urge the creation of a learning target) and then work backwards to develop the learning activities to help students to meet that end. Rather than define what topics need to be covered and create the assessment to match it after the fact, reversing the order of this process will ensure that all of the lesson's activities enhance the ultimate learning objective. (For more information on how this backwards planning process relates to individual lesson creation and the Two Step lesson planning format, see Jones, Vermette & Jones, 2009).

5.) The teacher does not know how to start the lesson

As one of the most prominent educational theorists of the 21st century, Madeline Hunter's work with lesson planning and delivery has come to dominate the practice of secondary and post secondary

schooling. In her eight step lesson planning model, Hunter called for each lesson to start with an anticipatory set (also referred to as the focusing activity) which draws student attention before the lesson begins. This can be a sample problem, series of questions, story or quick review, but must prepare and motivate students for learning (Hunter & Hunter, 2004).

Implementation of this idea spelt trouble for many of the pre-service teachers in our study who began their lessons with brief activities with little or no meaningful student engagement. Most commonly executed though a teacher lecture, reading passage or both, we found that rather than motivating learners, a quick Hunter-style "hook" left both teachers and students frustrated and unfocused. Not only did implementation of such an anticipatory set have little impact on student motivation, it also does not sufficiently prepare students for the required learning tasks. Our pre-service teachers had trouble crafting a simple, short activity to motivate every student for 40 or more minutes of instruction.

For our first and second year teachers, failure to effectively start the lesson was only magnified by the acute classroom management issues which ensued due to these inadequacies. Failure to hook students at the beginning of the lesson left students confused and unwilling to persist, becoming disengaged and passive throughout the duration of the lesson. Even when the teacher had activities later in the lesson that were active and engaging, the failure of the anticipatory set in the first few minutes of class left students unable to

adequately make use of their prior knowledge and thereby accomplish the task.

Recommendations:

In an effort to help our pre-service teachers more fully understand what is required to prepare students for learning, we have shifted our focus away from a simple, several minute activity to an extended anticipatory set called exploratory phase of the lesson (Flynn, Mesibov, Vermette & Smith, 2004). As described by Jones, Vermette & Jones (2009) the exploratory phase is a set of activities which, (like the Hunter model) grabs the learner's attention, elicits prior knowledge, and helps students generate the basic understandings required during the lesson. Unlike the anticipatory set however, it is not quick two minute activity, but it may involve several activities or even several class periods. A 45 minute math lesson might include 20 minutes of exploratory activities, followed by 25 minutes of discovery work; however the phases are fluid and therefore can be extended or reduced at the teacher's discretion. The exploratory phase is meant to help students play with ideas and creates the conditions by which students can later assimilate new concepts into their existing schema. It may take a longer or shorter time depending on the students' level of motivation, or prior knowledge, as well as the complexity of the discovery task at hand. We teach our pre-service educators that the exploratory phase rarely begins with a teacher monologue, but rather is designed to help students actively prepare for the learning task.

6.) *Students are passive recipients of knowledge*

In a 2007 survey of 110 schools in 26 states, nearly two-thirds of American high school students stated that they were bored in school everyday. 75% of students reported that "the material isn't interesting enough," 39% stated that "the material is not relevant" and 32% that "the work is not challenging enough" (Kuh, 2007). With this significant level of disengagement present in American schools, it comes with little surprise that many of our pre-service teachers view the role of a learner as the passive gatherer of new information. Many of their lessons involve PowerPoint presentations or laborious teacher lectures, leaving students to sit quietly and listen. Our pre-service teachers' lessons often lack authenticity and student engagement and require students to consider and recall facts rather than negotiate conceptual meaning. Much of the student work is simply note-taking rather than synthesis or application of ideas. Darling-Hammond & Bransford (2004) address this problem in their text *Preparing teachers for a changing world* by stating that, "preconceptions that teaching is only about "transmission" can make it difficult for teacher educators who seek to prepare teachers in ways that are more compatible with what we now know about how people learn. These more successful methods are often fundamentally different from how the student teachers were taught and sometimes, from how the teacher educators themselves learned as students" (pg. 369). Thus we have made it our job as teacher educators to shift the paradigm. We need

our pre-service teachers to teach differently than they were taught and we must help them relearn what effective instruction looks like in 5-12 classrooms.

Recommendations:

Though increasing teacher effectiveness by transforming teacher education may sound like a tremendous undertaking, decades of research overwhelmingly shows a correlation between level of teacher preparation and student achievement (Darling-Hammond, L., Berry, B., & Thoreson, A., 2001; Boe, E., Shin, S., & Cook, L., 2007; Guyton, E., & Farokhi, E., 1987; Easton-Brooks D., & Davis A., 2009). We suggest teacher educators reflect with their pre-service teachers on the recommendations suggested and intentionally discuss the lesson planning and delivery decisions they are making. Through pre-service teachers may have never experienced effective teaching during their own K-12 experiences, the traditional paradigm will be easier to overcome if one has experienced and reflected on its differences from both a teaching and learning perspective. Asking pre-service teachers to reflect on their own learning is not only a tremendous learning experience, but one which stands to significantly change how pre-service teachers view effective instruction.

Discussion

There is much more that goes into being a master of lesson design than the six tips that have been outlined in this piece. In an attempt to provide novice teachers with a lesson planning format which specifical-

ly helps them to avoid these six lesson planning pitfalls, the authors of this piece, (as well as several of their colleagues) have created a lesson planning format called the "Planned Learning Experience" or PLE (Vermette, Jones, Jones, Werner, Kline & D'Angelo (2010)). Since lesson plans are traditionally thought of as what the teacher does, the PLE is unique in that it focuses on what the students will be doing, thereby holding true to the need for active learning and assessment that has been highlighted throughout this piece.

Although this lesson planning format has been around for nearly a decade (Vermette, Jones, Jones, Werner, Kline & D'Angelo, 2010), in light of this action research, the PLE has been revised to keep these six tips at the forefront of any novice teacher's mind as he/she plans learning experiences. Derived from our analysis of data, the PLE format is displayed in figure 3.

Figure 3

Planned Learning Experience (PLE) Format

Cognitive and affective learning target(s): _____

(1) How will students show their understanding of the above learning target(s)? Why is it important?

(2) What state standards (performance indicators or relevant curriculum guide) will this learning target(s) address?

Exploratory Phase:

(3) How will the learning experience begin in a way that engages each student and forces connections to prior knowledge?

(4) How will you ensure that all students are ready to meet this learning target by:

- (a) Developing interest in this lesson
- (b) Using prior knowledge
- (c) Building classroom community
- (d) Fostering positive relationships with every student during instruction?

(5) What formative assessment data will you collect during the exploratory phase to guide instruction during this lesson?

(6) How will you use the formative assessment learning data to guide the rest of this lesson? What specific interventions will be planned to differentiate instruction?

Discovery Phase:

(7) What authentic assessments of learning (discovery work) will students produce to demonstrate their new understanding of the lesson's learning target? How does this align with the Six Facets of Understanding (Wiggins & McTighe, 2005)?

(8) What spontaneous and planned interventions will you have available to assist students in developing their authentic assessments of learning (discovery work)?

(9) How will you provide closure to the lesson in a way that allows students to reflect on the lesson's learning target(s)?

(10) What future opportunities will ensure that students who have not yet met the learning target(s) are able to do so?

Implementation:

(11) What materials, technological equipment and/or human resources are required to successfully implement this lesson?

(12) What is the essential and non-essential content vocabulary required to successfully implement this lesson?

There are several things to notice when planning with the PLE. First of all, this non-traditional lesson plan is designed as a comprehensive set of questions because it was designed to guide pre-service teachers through the lesson planning process as if one of their co-teachers was sitting next to them throughout this process. This lesson planning format intentionally utilizes the concepts of backwards design (Wig-

gins & McTighe, 2005), learning targets (Stiggins, 2008), the Two Step (Flynn et al., 2004) and the Six Facets of Understanding (Wiggins & McTighe, 2005) which have been outlined in this piece. A table demonstrating the alignment of the PLE to our recommendations are outlined in figure 4.

Figure 4

Component of the PLE	Lesson planning pitfall is component addresses	How does the PLE address this pitfall?
(1) How will students show their understanding of the above learning target(s)? Why is it important?	The learning objective is unclear	By answering this question novice teachers must write the learning target(s) (the specific "I can..." statements) for the lesson.
(2) What state standards (performance indicators or relevant curriculum guide) will this learning target(s) address?	The learning objective is unclear	By linking the lesson's learning target to related state standards novice teachers must consider the applicability of the learning target to established curriculum goals.
(3) How will the learning experience begin in a way that engages each student and forces connections to prior knowledge?	The teacher does not know how to start the lesson Students are passive recipients of knowledge	By articulating their first exploratory activity, novice teachers must plan for student engagement from the beginning of the lesson by starting with students' prior knowledge and experiences.
(4) How will you ensure that all students are ready to meet this learning target by: (a) Developing interest in this lesson (b) Using prior knowledge (c) Building classroom community (d) Fostering positive relationships with every student during instruction?	The teacher does not know how to start the lesson Students are passive recipients of knowledge	By extending the exploratory phase of the lesson, there are multiple instructional entry points. This question ensures that novice teachers plan a series of activities that require meaningful active engagement at the beginning of the lesson.

<p>(5) What formative assessment data will you collect during the exploratory phase to guide instruction during this lesson?</p>	<p>Students do not create an assessment of their understanding or the assessment is completed outside of class</p> <p>Students do not create evidence of their developing ideas</p>	<p>Asking novice teachers to describe the data they will collect in the exploratory phase ensures that:</p> <p>(a) even early in the lesson, students are required to demonstrate evidence of their understanding</p> <p>(b) evidence of understanding is created in class so it can be reviewed by the teacher</p>
<p>(6) How will you use the formative assessment learning data to guide the rest of this lesson? What specific interventions will be planned to differentiate instruction?</p>	<p>Students do not create an assessment of their understanding or the assessment is completed outside of class</p> <p>Students do not create evidence of their developing ideas</p> <p>The assessment does not match the learning objective</p>	<p>By asking novice teachers how they plan to use the data they collect, this question assures that:</p> <p>(a) Students create evidence of their understanding (in class) during the exploratory phase of the lesson.</p> <p>(b) This evidence is aligned to the learning objective so that it can be used throughout the remainder of the lesson.</p>
<p>(7) What authentic assessments <i>of learning</i> (discovery work) will students produce to demonstrate their new understanding of the lesson's learning target? How does this align with the Six Facets of Understanding (Wiggins & McTighe, 2005)?</p>	<p>Students do not create an assessment of their understanding or the assessment is completed outside of class</p> <p>Students do not create evidence of their developing ideas</p> <p>The assessment does not match the learning objective</p> <p>Students are passive recipients of knowledge</p>	<p>This question ensures that during the discovery phase further evidence of understanding is created and collected. By asking novice teachers to articulate how it is aligned to the lesson's learning target, novice teachers must think about how the assessment aligns to the lesson's objective. By linking the discovery work to Wiggins & McTighe's Six Facets of Understanding, students are given tasks which demand active engagement and critical thinking.</p>

(8) What spontaneous and planned interventions will you have available to assist students in developing their authentic assessments of learning (discovery work)?	Students do not create an assessment of their understanding or the assessment is completed outside of class Students do not create evidence of their developing ideas	By asking novice teachers how they will attend to the needs of all learners, novice teachers must articulate their vision of the discovery phase and anticipate student misconceptions. This requires that students create evidence of their understandings and that it is available for the teacher to assess.
(9) How will you provide closure to the lesson in a way that allows students to reflect on the lesson's learning target(s)?	The assessment does not match the learning objective	By concluding the lesson in a way which aligns with the lesson's learning target, novice teachers must think about how student assessments are aligned to the lesson's learning goal.
(10) What future opportunities will ensure that students who have not yet met this learning target(s) are able to do so?	Students do not create an assessment of their understanding or the assessment is completed outside of class Students do not create evidence of their developing ideas	Asking novice teachers how they plan to use the data collected from students ensures that: (a) Data was collected at various points in the lesson (b) This data provides useful information regarding students' current level of understanding of the lesson's learning target.

In addition, although it has not been widely discussed in this piece, the PLE is unique in that it pays special attention to developing students' affective dispositions. Current research shows that developing students affective skills is linked to cognitive growth (Elias & Arnold, 2006; Jones, Vermette, & Jones, 2009.) While it may seem cumbersome and lengthy for experienced teachers, we have used versions of the PLE for decades and have found that it is a necessary and comprehensive planning tool for novice educators.

Finally, we offer an exemplar of a 7th grade mathematics lesson planned with the

PLE. We provide this model as an exemplar of the type of instruction adapted from Lappan (1998) that we hope our pre-service teachers will one day design. We hope that the suggestions offered in this piece will help all novice teachers to plan more comprehensive, student centered lessons to foster student motivation and achievement. As you read, please notice how the lesson planning pitfalls as described in the previous table are addressed in this sample PLE.

An example from the field: The PLE framework in action

Below is a sample PLE produced while field-testing the PLE model in an inclusive 7th grade mathematics classroom. Students in this class were in their fifth lesson of a unit on data analysis and statistics.

Cognitive and affective learning target(s):

(1) I can distinguish between categorical and numerical data and make meaning from this data.

(2) I can respectfully seek help from members of my base group when needed.

(1) How will students show their understanding of the above learning target(s)?

Why is it important?

In this lesson, students will demonstrate their understanding of the differences between categorical and numerical data. They will learn how each type of information is used and discover the significance of these types of data through examination of a series of bar graphs. This lesson is important because it serves as an introduction to statistical analysis and provides students with new set of vocabulary they can use to describe data. This lesson allows students the opportunity to relate this new vocabulary to their prior conceptual understandings. Students will provide evidence of the affective competency of help-seeking by asking for and accepting help from members of their base group. This is an essential skill in mathematics and in life, as students will often confront challenges and they need effective strategies for overcoming them.

(2) What state standards will this learning target(s) address?

6.S.7 Read and interpret graphs

6.S.8 Justify predictions from data

6.S.7 Read and interpret graphs

7.S.4 Calculate the range for a given set of data

7.S.5 Select the appropriate measure of central tendency

7.PS.11 Work in collaboration with others to solve problems

7.CM.5 Answer clarifying questions from others

7.CN.6 Recognize and provide examples of the presence of mathematics in their daily lives

7.CN.8 Investigate the presence of mathematics in careers and areas of interest

Exploratory Phase:

(3) How will the learning experience begin in a way that engages each student and forces connections to prior knowledge?

To begin this learning experience, students will consider a set of 10 personal questions such as “What is your favorite type of pet?” and “How many pets do you own?”. Drawing on previous experiences and the students’ real lives, students will answer these questions and then as a class discuss how questions can be used to collect data about other people. Students will classify each question according to the type of information they could elicit from these responses. They will label categorical information (“word data”) with a C, and numerical data (“number data”) with a N. This activity is designed to draw out stu-

dents' current understandings of types of data, and provide confidence as students engage in discussions about their prior knowledge and experiences.

(4) How will you ensure that all students are ready to meet this learning target by:

- (a) Developing interest in this lesson
- (b) Using prior knowledge
- (c) Building classroom community
- (d) Fostering positive relationships with every student during instruction?

Since asking the right question is the key to getting the right information, students' next learning experience will ensure that they can ask questions to elicit either "number" data or "word" data. In order to ground this activity in the students' experiences, students will write questions to a peer based on a topic of their choice. After a teacher models this process, students will write four things they know a lot about. Then using one student's topic as the class demo, student teams will write two questions to elicit numerical data and two questions to elicit categorical data from this student about his/her topic. After team time to discuss their ideas, student questions will be shared with the whole group.

In an effort to emphasize the real life application of such questioning techniques, students will then choose one of nine careers to think about in their teams. Working collaboratively, students will write three questions to elicit numerical data and three questions to elicit categorical data from that person. At this point in the lesson students will be encouraged to appropriately seek help from their team-

mates if they have trouble. A quick teacher provided example of what appropriate help seeking looks like will be offered. Student questions will then be debriefed whole group.

(5) What formative assessment data will you collect during the exploratory phase to guide instruction during this lesson?

Evidence of student understanding will be collected as students identify pieces of categorical and numerical data and write questions for their peers. The teacher will monitor progress, ask clarifying questions to assess student understanding and insert or delete exploratory activities as necessary. Students will be provided feedback in both their small groups and as a whole group. The creation of student questions, as well as interpretation the categorical and numerical data on a bar graph are both summative and formative assessments. They will help to guide instruction and demonstrate that learners are developing these understandings. Information about student progress of the affective learning target will also be collected through teacher observation and student questioning.

(6) How will you use the formative assessment data to guide the rest of this lesson? What specific interventions will be planned to differentiate instruction?

As the teacher "works the room" and debriefs as a whole group, evidence of student understanding about categorical and numerical data (as well as the affective competency of help-seeking) will be collected. Based on this evidence, the teacher may choose to shorten or lengthen the

exploratory activities and use observed misconceptions or common errors as entry points for student discussion. The teacher may choose to pose additional questions to scaffold student understanding based on the assessment data collected.

Discovery Phase:

(7) What authentic assessments of learning (discovery work) will students produce to demonstrate their new understanding of the lesson's learning target(s)? How does this align with the six facets of understanding (Wiggins & McTighe, 2005)?

To apply, extend and connect students' developing understandings of categorical and numerical data with the distributions of data they have considered throughout this unit, students' discovery work will require student teams to interpret data from a series of bar graphs. Each bar graph describes the results of a poll by a store owner looking to make informed selling and purchasing decisions (and also reiterating the career and real life applications). Since one bar graph provides categorical data and one provides numerical data, students must differentiate between the type of information each can provide and state why each is useful. Students will document their ideas by completing a series of questions that require them to think about the information each graph provides and how it can be used. This assessment ties directly to the lesson's learning target since students must distinguish and interpret the categorical and numerical data provided in each graph. This discovery work is aligned with Wiggins and McTighe's

(2005) facets of explain, interpret and apply. This task requires that students make meaning from two different representations of data, explaining not only the trends and patterns they see, but how they can be used to make decisions about purchasing and sales. These are diverse contexts which require conceptual transfer of their developing ideas.

(8) What spontaneous and planned interventions will you have available to assist students in developing their authentic assessments of learning (discovery work)?

For students who struggle to read and/or interpret the categorical and numerical information provided by the bar graphs, additional teacher and team interventions will be provided. Students' previous investigation from this unit had learning targets specifically designed to help students sense of information from bar graphs, and can be referenced as needed. Since students are working in base groups of three, struggling students will be directed to work and ask questions of their teammates during the lesson. These investigations will be collected at the end of the period so that more formal, individualized written feedback can be provided.

(9) How will you provide closure to the lesson in a way that allows students to reflect on the lesson's learning target(s)?

To conclude this learning experience, the teacher will lead a whole group debrief of the categorical and numerical information provided from the bar graphs. Students will consider the strengths of each distribution as well as the advantages and

limitations of each graph. Students will also provide evidence that they have met their affective learning target by completing the sentence prompt "Today I was helped from my teammates when..." on a piece of notebook paper. This simple, one question outslip will be collected as evidence of students help seeking behaviors.

(10) What future opportunities will ensure that students who have not yet met the learning target are able to do so?

Students who have not yet met this learning target will have the opportunity to continue thinking about these ideas during tomorrow's lesson, as the concept of numerical and categorical data is spiraled throughout the rest of the unit. Weekly student reflection sheets and homework assignments will also give students an opportunity to think deeply about both the cognitive and affective learning target.

Implementation:

(11) What materials, technological equipment and/or human resources are required to successfully implement this lesson?

- Investigation 1.5: Using different data types
- Manila folders with bar graphs (1-2 per team)
- Learning targets on board

(12) What is the essential and non-essential content vocabulary required to successfully implement this lesson?

Essential Vocabulary:

- bar graph
- categorical data
- numerical data
- help seeking

Nonessential Vocabulary:

- range
- prediction

Source: Vermette, Jones, Jones, Werner, Kline & D'Angelo (2010)

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